Amendments to the Specification:

Please replace the paragraph beginning on page 1, line 10, with the following amended paragraph.

Digital image detectors, such as CCD sensors used in conventional video cameras, have been adapted to be x-ray sensitive elements in dental x-ray applications. For the past few decades, CCD sensors have been established as a leading technology in high-performance digital x-ray imaging. Unlike matrix-addressed sensors like amorphous silicon panels and CMOS imagers, CCD sensors read out their signal by transporting charge packets across their silicon substrate. The advantages of using a CCD sensor in conjunction with a typical digital x-ray diagnostic system often include high resolution and sensitivity, low noise and reduced radiation loads. Examples of inventions using CCD-type sensors in dental environments are described in U.S. Patent Numbers 5,513,252, 5,784,429, and 6,002,742 ~~which are incorporated herein by reference~~.

Please replace the paragraph beginning on page 7, line 9, with the following amended paragraph.

FIG. 2 is a top plan view of ~~the~~ an embodiment of a control panel ~~of another embodiment of a system~~ that ~~operates in accordance with the teachings~~ is part of the system of the present invention; ~~and~~

Please replace the paragraph beginning on page 7, line 11, with the following amended paragraph.

FIG. 3 is a block diagram illustration of another embodiment of a system that operates in accordance with the teachings of the present invention;

Please replace the paragraph beginning on page 7, line 13, with the following amended paragraph.

FIG. 4 is a graph illustrating ~~the~~ a prior art method of preparing the sensor to receive radiation from the x-ray source.; and

Please replace the paragraph beginning on page 7, line 15, with the following amended paragraph.

FIG. 5 is a graph illustrating a method ~~for~~ of preparing the sensor to receive radiation from the x-ray source according to a preferred embodiment of the invention.

Please replace the paragraph beginning on page 8, line 13, with the following amended paragraph.

Referring now to FIG. 1, the invention provides a system 2 that includes an x-ray source 4, which provides a highly focused x-ray beam to penetrate through a patient 3. The x-ray source 4 is positioned by a dental technician in a manner to direct the radiation toward a selected area of the mouth of the patient. The x-ray source 4 is operably connected to a source control unit 6 which controls the operation of the x-ray source and performs the role of communication medium for signals originating both in a control panel 12 and ~~a sensor~~ an image processor 10. The source control unit 6 ~~is~~ communicates with the control panel 12 through any suitable connection such as a wireless connection or an electronic line connection 5, and to the ~~sensor~~

image processor 10 again through any suitable communication connection such as a wireless connection or an electronic line connection 7. The source control unit 6 and the control panel 12 can be ~~connected~~ housed in a single enclosure 1 or can be detachable in order to enable remote operation. The image sensor 8 is coupled to ~~the~~ a sensor driver 15 by any suitable means, including a wireless connection or an electronic line connection 9. The sensor driver 15 is connected to the image processor 10. Very often the sensor driver 15 and the image processor 10 can be integrated or presented as a single unit 13. Alternatively the functions of the image processor 10 can be performed from available computing devices such as desktop computers, tablet PCs, laptops and PDAs. Finally, the presentation unit 14 is coupled to the ~~sensor~~ image processor 10 through a wireless or wired electronic line connection 11. Preferably, each of the electronic connections ~~provides~~ provide bi-directional signal transmission.

Please replace the paragraph beginning on page 9, line 10, with the following amended paragraph.

As indicated above, the source control unit 6 is operably engaged to the x-ray source 4 and is electronically coupled to both the control panel 12 and the ~~sensor~~ image processor 10. The control panel 12, in one embodiment, generates pre-determined exposure parameters and information, including time and intensity (hereinafter, "settings") that permit the synchronization of the operation of the x-ray source 4 and the image sensor 8. The control panel 12 is equipped with control buttons 16 for manual entry of exposure settings based on a library of exposure settings determined to be optimal for a certain category of tooth and physical anatomy of the patient 3. The control panel 12 is usually placed in an area or room provided with radiation

attenuating properties. Once the source control unit 6 receives the exposure settings, it simultaneously redirects the settings to both the x-ray source 4 and the ~~sensor~~ image processor 10. The ~~sensor~~ image processor 10 then transmits the exposure settings to the image sensor 8, causing the image sensor 8 to charge in anticipation of the activation of the x-ray source 4.

Please replace the paragraph beginning on page 10, line 1, with the following amended paragraph.

The image sensor 8 is positioned opposite the x-ray source 4 and detects two-dimensionally an x-ray image ~~16~~, as the x-rays pass through the patient 3, as a slit image which is vertically elongated. The image sensor 8 then converts the image into electrical signals. A well-known x-ray image sensor 8 such as a CCD (Charge Coupled Device) or a CMOS (Complementary Metal Oxide Silicon) sensor is preferably used to capture the image. The image sensor 8 preferably includes a scintillator, which converts an x-ray into visible light, and a semiconductor device, which converts an image formed on the scintillator into electrical signals with a high sensitivity. The advantage in having the image sensor 8 receive an exposure signal lies in the fact that conventional CCD devices need to be in a charged state so that they are in constant readiness for incoming radiation. The use of CCDs in such a perpetual state of charge leads to increased noise accumulation along an unregulated exposure integration cycle, which detrimentally affects the quality of the resultant image. By receiving a signal as to when the x-ray source 4 is to be activated, along with the information as to the length of exposure and any other information comprising the settings, the image sensor 8 is able to provide the best quality

images requiring neither perpetual charging nor radiation sensing elements disposed about the sensor.

Please replace the paragraph beginning on page 10, line 18, with the following amended paragraph.

The ~~sensor~~ image processor 10 receives the analog output signal generated by the image sensor 8 through line connection 9, converts the output into a digital value for each image pixel, and formats the digital pixels into a digital image format. Preferably, the ~~sensor~~ image processor 10 is a personal computer equipped with mass storage to store data and display the images on a monitor. The ~~sensor~~ image processor 10 also has a built-in modem, wireless or wired network interface, or other communication device capable of transmitting the digital images to a remote location for inspection of the images. Conversion and manipulation of the images obtained using the system of the present invention is controlled by ~~an~~ a software program in the image processor 10, preferably a digital detection software program, designed in the preferred embodiment to operate in the Microsoft Windows® environment but not excluding other operating systems as Linux®, Unix®, or Palm®, among others. Manipulation functions may include, but are not limited to, the modification of the displayed contrast, magnification of the displayed image, digital stretching, sharpening of the image, point-to-point measurements, annotation of the image, storage and retrieval of stored images, and correction of the orientation of the image to correct for differing operating positions of the image sensor 8. In the preferred embodiment as shown in FIG. 1, the ~~sensor~~ image processor 10 is equipped to electronically communicate image data to the source control unit 6 which then relays the image data to the control panel 12 for

display. In another embodiment, the ~~sensor~~ image processor 10 may communicate directly with the control panel 12. In a still another embodiment of the present invention, the ~~sensor~~ image processor 10 may be configured and positioned in a manner to present the displayed image to the patient.

Please replace the paragraph beginning on page 11, line 17, with the following amended paragraph.

As indicated above, presentation unit 14 is also shown in FIG. 1 coupled to the ~~sensor~~ image processor 10 through connection 11. The presentation unit 14 receives the formatted images from the ~~sensor~~ image processor 10 and may take the form of a personal computer, a flat solid state digital display panel, or a conventional CRT with a digital signal converter. The presentation unit 14 is preferably employed in a separate office away from the x-ray source 4 and is preferably capable of displaying the full dynamic range and resolution of the image sensor 8. In another embodiment, the presentation unit 14 may be integrated in such a manner that the image processor software may operate within the presentation unit 14 to allow for the manipulation and storage of the images.

Please replace the paragraph beginning on page 12, line 3, with the following amended paragraph.

FIG. 2 shows control panel 24, which may be similar in functionality to control panel 12, in accordance with another embodiment of the present invention. The control panel 24 of the present embodiment comprises an intelligent display unit or PDA-type device with a flat solid

state display 17 for the presentation of images received from the ~~sensor~~ image processor 10. A PDA or Personal Digital Assistant is a pocket-sized personal computer which is typically used to store phone numbers, appointments, and to-do lists. Some PDAs have a small keyboard, whereas others have only a special stylus that is used for input on a touch sensitive screen. A PDA can also have a wired or wireless network adapter or a wired or wireless modem, including a fax modem. Files can be created on a PDA which are later entered or transferred into a larger computer.

Please replace the paragraph beginning on page 12, line 20, with the following amended paragraph.

Image processor software similar in features and functions to those described above for the ~~sensor~~ image processor 10 may be provided in the control panel 24 to provide manipulation functions including but not limited to modifying the displayed contrast, adjusting the magnification and brightness of the displayed image, and sharpening of the image. A set of function buttons 16, preferably located beside the display panel 17, are used to access some of the processing features of the control panel 24. These function buttons 16 may allow the technician to manually enter a known exposure setting, which may then be reflected in the digital number display 21 adjacent to ~~the~~ additional function buttons 19, which allow a user to change certain parameters. The control panel 24 may also include a series of parameter buttons 23, 31, 25, including one 23 for a selection panel 27 representing each category and orientation of tooth types to be irradiated. Another parameter button 25, which corresponds to selection panel 29, may be used to enter the physical size of the patient, or to select a size from a list provided. The

technician, depending on which category of tooth is to be examined, enters a specific tooth anatomy from the listed selection panel 27 by selecting the desired category and orientation as indicated on the panel. Similarly, depending on the physical maturity of the patient, the technician may use a parameter button to select one of the available patient sizes on selection panel 29. A calibrator, preferably in software, is supplied with the control panel 24 to calculate the optimal exposure times based on the entered anatomical parameters. This calibration software matches the entered exposure parameters to a library of known optimal exposure ranges saved in the control panel database. There may also be an operation mode button 31 that controls the status of the control panel 24 by providing a set of alternative condition modes 33. Preferably, the condition modes include: 1) a "display mode," depicted in FIG. 2 by an image of a monitor used for displaying and manipulating images; 2) a "static mode," depicted in FIG. 2 by an image of a reel of film used to set the exposure parameters; and 3) an "active mode," depicted in FIG. 2 by an image of a reel of film with a bolt of electricity disposed about the middle, to indicate that the x-ray source is activated. Other images may also be used. An exposure button 37 may be supplied so as to, when pressed, initiate the transfer of the exposure settings.

Please replace the paragraph beginning on page 14, line 3, with the following amended paragraph.

Referring now to FIG. 3, in yet another embodiment of the present invention, the calibration software is run in an image processor 39 rather than the control panel. The image processor 39 is coupled and communicates with a control panel 42 through an information interface 44 or a local connection 41. The information interface 44 can be any commercial

interface as DICOM or private developed communication interface or other compilation of control, acquisition and communication interfaces. To initiate the system, the technician inputs the exposure parameters as described above. However, the control panel 42 in this embodiment does not contain calibration software. Instead, the packaged exposure parameters are communicated by the control panel 42 directly to the image processor 39. The ~~sensor~~ image processor 39 is additionally coupled to both the sensor control unit 45 and the image sensor 47 through a sensor driver 38. On receiving the exposure parameters, the image processor 39 calculates the optimal corresponding exposure times using the calibration software and then simultaneously signals both the sensor control unit 45 and the image sensor 47 with the exposure settings. The sensor control unit 45 then activates the x-ray source 49 with the pre-determined settings. After the image is captured, the image sensor 47 communicates the analog CCD image to the ~~sensor~~ image processor 39 for conversion and formatting. The finished image is then communicated over the information interface 44 to either/both the remote presentation unit 50 or/and storage database 43 or/and the control panel 42 which contain the digital detection software for manipulation and display. The source control unit 45 and the control panel 42 can be housed in a single enclosure 48 or can be detachable in order to enable remote operation.